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METHOD OF OBTAINING CURRENT-CONDUCTING POLYMERIC MATERIALS

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Block	Italic	Transliteration	Block	Italic	Transliteration
А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Й й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*ye initially, after vowels, and after ъ, ь; e elsewhere.
When written as ё in Russian, transliterate as yё or ё.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	$\sinh^{-1}$
cos	cos	ch	cosh	arc ch	$\cosh^{-1}$
tg	tan	th	tanh	arc th	$\tanh^{-1}$
ctg	cot	cth	coth	arc cth	$\coth^{-1}$
sec	sec	sch	sech	arc sch	sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian	English
rot	curl
lg	log

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METHOD OF OBTAINING CURRENT-CONDUCTING POLYMERIC MATERIALS.

L. K. Derez and B. S. Tu$'chinskiy.

328153.

Invention refers to technology of obtaining polymeric materials, which possess low electrical resistance.

Method of obtaining current-conducting polymers by solidification of a suspension of ferromagnetic filler, for example powder of carbonyl iron in epoxy, in a permanent magnetic field is known.

However, high expenditure of filler decreases physicomechanical properties of material, and materials, obtained using this method, possess significant specific electric resistance.

Target of invention is an increase of electroconductivity of polymeric compositions and reduction in expenditure of filler.

This is achieved by simultaneous effect on suspension of ferromagnetic filler in polymer: magnetic field with an intensity of 300±20 oersteds, ultrasonic irradiation with frequency of 400-440 kHz and direction, which coincides with direction of magnetic lines of force, and excess pressure 0.3-0.5 atm(gage).

Intensity of magnetic field is selected such that magnetic

susceptibility of ferromagnetic filler would be maximum.

Since formation of "iterated networks" occurs during simultaneous directional effect on particles of ultrasonic oscillations, magnetic field and excess pressure, then "packing" of particles into networks is maximum, which leads to a decrease of contact (transient) resistances.

Example 1. 82 pbw of epoxy ED-6, 14 pbw of polyethylenepolyamine, 12 pbw of dibutyl phthalate even 20 pbw of powder of carbonyl nickel (PNK-1) are thoroughly intermixed, obtained suspension is poured into a mold from fluoroplast (for easing of subsequent removal of finished article), which is established between poles of an electromagnet, supplied with direct current. The field strength is maintained at 300±20 oersteds, since nickel with this strength has maximum magnetic susceptibility. The solidification of composition is conducted at excess pressure 0.3-0.5 atm(gage), temperature of 40-50°C under the simultaneous influence of ultrasound with a frequency of 400 kHz, source of which can be, for example, piezoelectric supersound projector of the type TSP-V1. The direction of propagation of ultrasound must coincide with the direction of the lines of force of magnetic field.

Ultrasonic irradiation and action of magnetic field are continued until partial solidification of compositon (0.8-1.5 hour).

This processing leads to the formation of optimal "chain" structure.

In magnetic field specific resistance of obtained polymer 0.1 (0.01) Ω/cm, concentration of filler 12% (20)%.

In magnetic field under influence of ultrasound and excess pressure 0.5 atm(gage) specific resistance of obtained polymer 0.03 (0.0032) Ω/cm, concentration of filler 13% (22)%.

Example 2. 72 pbw of a polyester resin of type PN-1, 4 pbw hydroperoxide of isopropyl benzene, 8 pbw naphthenate of cobalt and 15 pbw of carbonyl nickel PNK-1 powder are thoroughly intermixed and poured into mold of Ftorlon-4, where solidification occurs.

Exciting factors: strength of magnetic field 300±10 oersteds, excess pressure 0.4 kg/cm², frequency of sound 350 kHz. Temperature in the processing process of 20-30°C.

Example 3. 55 pbw of the polyester resin PN-3, 15 pbw of methylmethacrylate, 15 pbw of styrene, 1-2 pbw of peroxide of cyclohexanone and 20 pbw of the powder of carbonyl nickel PNK-1 are thoroughly intermixed and poured into a mold of Ftorlon-4, where occurs solidification.

Exciting factors: strength of magnetic field 300±10 oersteds,

excess pressure 0.5 kg/cm², frequency of sound 300 kHz. Temperature in the processing process of 50-60°C. Time of action of the exciting factors 9-10 min.

Example 4. 25 pbw of latex polyvinyl chloride, 50 pbw of dibutyl phthalate, 1- 2 pbw of calcium stearate and 12 pbw of carbonyl nickel PNK-1 powder are mixed at 140-150°C after the total swelling of resin in DBF. The thoroughly mixed suspension is poured into a molf of Ftorlon-4 and place in a magnetic field with simultaneous ultrasonic irradiation. Polymer is solidified during cooling to 100-110°C.

Exciting factors: strength of magnetic field 300±10 of oersteds, excess pressure 0.4 kg/cm², frequency of sound 330 kHz. Time of the effect of the exciting factors 12-18 min.

Example 5. 80 pbw of methylmethacrylate (monomer), 1-2 pbw of peroxide of benzene, 1 pbw of dimethylaniline and 12-15 pbw of carbonyl nickel PNK-1 powder.

Components are thoroughly intermixed and poured into mold of Ftorlon-4. The latter will be assigned to thermostat and melting point will be increased to 100°C.

Exciting factors: strength of magnetic field 300±10 oersteds, excess pressure 0.3 kg/cm², frequency of sound 370 kHz. Effect of the exciting factors - to the complete gelation of composition.

Example 6. 10 pbw of furan resin FA, 20 pbw of graphite, 3 pbw of benzenesulfonic acid and 15 pbw of carbonyl nickel PNK-1 powder thoroughly intermixed and poured into mold of Ftorlon-4.

Exciting factors: strength of magnetic field 300±10 oersteds, excess pressure 0.3 kg/cm^2, frequency of sound 350 kHz.

Subject of invention.

Method of obtaining current-conducting polymeric materials by solidification of suspension of ferromagnetic filler, for example powder of carbonyl nickel in polymer, in permanent magnetic field, that is characterized by fact that for purpose of increase in electroconductivity of polymeric compostion and reduction in expenditure of filler, processing process is conducted at excess pressure 0.3-0.5 atm(gage) with simultaneous ultrasonic irradiation of suspension by ultrasound with frequency 400-440 kHz, intensity lower than threshold of onset of cavitation and by direction, which coincides with direction of magnetic lines of force.

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